

Appl. No. 09/847,357
Amdt. Dated July 19, 2004
Reply to Office action of April 21, 2004
Attorney Docket No. P13442-US2
EUS/J/P/04-3163

REMARKS/ARGUMENTS

Amendments

The Applicants have amended Claims 1, 12, 13 and 17. Claims 1-9, 11-15 and 17 are pending in the application. Favorable reconsideration of the application is respectfully requested in view of the foregoing amendments and the following remarks.

Claim Rejections – 35 U.S.C. § 103 (a)

Claims 1-3, 11-15 and 17 are rejected under 35 U.S.C § 103(a) as being unpatentable over United States Patent No. 6,014,102 A issued to Mitzlaff et al. (hereinafter Mitzlaff) in view of Grubeck et al (US 5,974,329 A) (hereinafter, Grubeck). The Applicant respectfully traverses the rejection of these claims.

Claim 1 defines a method for determining the position of a mobile station utilizing calibrations based on estimated positions and a plurality of measurements. The Applicants respectfully direct the Examiner to amended Claim 1.

1. (Original) A method for determining the position of a mobile station within a telecommunications system, the method comprising the steps of:
 - performing a plurality of measurements associated with a plurality of mobile stations;
 - estimating the position of the plurality of mobile stations based on said plurality of measurements, assuming no bias error;
 - creating calibration parameters based on the estimated positions and said plurality of measurements, wherein said step of creating calibration parameters further comprises:
 - deriving a first order approximation of the mobile station positions as a function of bias error; and
 - estimating the bias error using the first order approximation equation; and
 - refining the estimated positions of the plurality of mobile stations based on the plurality of measurements associated with the mobile stations and said created calibration parameters. (emphasis added)

The method of the present invention for determining mobile station position accounts for bias errors in relevant positioning parameters by performing a plurality of measurements associated with a plurality of mobile stations, assuming no bias errors. The present invention does not rely on terminals that are self-positioning. Multiple

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terminals measure more than the minimum number of base stations and then use the multiple measurements to estimate bias errors. The estimated bias errors are then determined in parallel with the position calculation. Calibration bias estimates are created based on both the plurality of measurements and estimated mobile station positions. (page 6, lines 1-7 and page 14, lines 5-14). The estimated position of the mobiles is then updated using the estimated bias parameters.

Mitzlaff appears to disclose a method and apparatus for calibrating location-finding equipment (LFE) within a communication system. Mitzlaff uses fewer calibration terminals to blanket a communication system's coverage area than the previous calibration systems because the calibration terminals are mobile. In the method disclosed by the Mitzlaff reference, error vectors are added to position estimates determined by LFE to provide a corrected position estimate. The error vectors are generated using the calibration terminals, which move through the communications system's coverage area. The calibration terminals are coupled with an independent position determining system such as a GPS receiver. The terminals are periodically polled for the location determined by a calibration terminal (actual position). Additionally, the terminals periodically broadcast a known sequence utilized by the LFE for determining a position estimate of the calibration terminal. The difference between the actual and LFE determined position estimates are utilized in calculation of error vectors. (Col. 2, lines 45-55). In other words, the outside system and the network in which the calibration terminal is roaming determine the position of the calibration terminal. The two measurements are then compared to determine an error vector. Effectively, Mitzlaff does not locate mobile stations; Mitzlaff calibrates mobile station location equipment. Regardless, in contrast to the Applicant's invention the Mitzlaff reference uses a location system external to the network in conjunction with the network location system to determine the error vector.

As noted above, Mitzlaff relates to a method and apparatus for calibrating mobile station location-finding equipment in contrast to the present invention, which relates to determining the position of a mobile station. The cited Mitzlaff reference (col 2, lines 5-13) indicates that previous methods used correction data obtained from fixed calibration

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terminals existing at known locations to calibrate the LFE. Mitzlaff's stated advantage over the calibration prior art is the use of moving calibration terminals. The present invention, on the other hand, estimates mobile station positions using calculated bias errors that are determined in parallel with the position calculation using a plurality of location measurements of a plurality of mobile stations. (Page 6, lines 1-7) The Applicant respectfully asserts that Mitzlaff does not disclose the subject limitations.

Grubeck appears to disclose a method and apparatus for determining the position of a mobile station. Grubeck discloses equations for measurement errors for 1) the sum of errors that are individual to each mobile and 2) systematic errors that are common to all mobiles (e.g., base station clock errors). Grubeck is applicable only for one mobile and no bias errors can be detected by using only one mobile with an unknown position. Thus, it is not possible to separate systematic bias errors from individual measurement errors in Grubeck.

In the Official Action, a correspondence is drawn between the claimed features of the present invention to features disclosed in Grubeck; that of assuming no bias in the estimation, deriving a first order approximation of the mobile positions as a function of bias error and estimating the bias error using the approximation. The Applicant has amended the limitation of assuming no bias to read no bias error. The limitation of assuming no bias error is cited as being found in column 2, line 40 – column 3, line 8. However, Applicant has reviewed this cited portion of Grubeck and finds no reference to the limitation "assuming no bias error." Instead, the cited portion of Grubeck describes measuring procedures for Time of Arrival (TOA) without stating the use of bias error. Absence of the limitation does not mean that Grubeck specifically assumes no bias error in calculations. Additionally, derivation of the first order approximation and estimating the bias error is compared to column 6, lines 16-42 of the Grubeck reference. This passage in Grubeck points out that prior knowledge of the mobile station position and expected measurement accuracy for handover candidates, an expected accuracy of the position fix of the mobile station can be determined. This passage is showing how this knowledge can be used to calculate the accuracy of a mobile station position not bias error estimation. (Col. 6, lines 16-19). The Applicant respectfully asserts that

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Grubeck does not supply the limitations as noted in the Detailed Action and Mitzlaff and Grubeck.

For all of the above reasons, Mitzlaff and Grubeck, taken singly or in combination, fail to teach or suggest all of the subject matter of claim 1 as required by 35 U.S.C. §103(a). As between claim 1 and the Mitzlaff and Grubeck references, the Applicants submit that amended, independent claims 12 and 13 contain limitations analogous to those found in claim 1. Additionally, claims 2-3, 11, 14-15 and 17 depend from claims 1 and 13 respectively and contain the same limitations. The Applicant respectfully requests the withdrawal of the rejection of these claims.

Claim 5 is rejected under 35 U.S.C § 103(a) as being unpatentable over Mitzlaff in view of Grubeck as applied to claims 1-3, 11-15 and 17 above and further in view of Wylie. The Applicants respectfully traverse the rejection of these claims.

Wylie appears to recite a method for correcting ranging errors associated with non-line of sight (NLOS) base stations. Line of sight (LOS) measurements are reconstructed and are used to correct the NLOS ranging errors. Wylie's method utilizes measurements associated with specific (NLOS) base stations, whereas bias error measurements in the Applicants' invention are made between any base stations that are in communication with a mobile station. Applicant respectfully submits that the Wylie reference also fails to disclose limitations recited in Applicant's claim 1 that are not disclosed in either Grubeck or Mitzlaff, and thus, claim 1 and all claims dependent therefrom are distinguishable from the Mitzlaff, Grubeck and Wylie references. Applicant respectfully submits that claim 5 is patentable over Mitzlaff, in view of Grubeck and further in view of Wylie for at least the above reasons.

Claim 6 is rejected under 35 U.S.C § 103(a) as being unpatentable over Mitzlaff in view of Hall *et al.* (US 6,424,837 B1). The Applicants respectfully submit that claim 6 is patentable over the art of record for at least the reasons recited above with respect to claims 1, 12 and 13.

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Claims 4 and 7-9 are rejected under 35. U.S.C § 103(a) as being unpatentable over Mitzlaff in view of Wimbush (US 4,494,119) (hereinafter, Wimbush). The Applicants respectfully traverse the rejection of these claims and submit that claims 4 and 7-9 are patentable over Mitzlaff in view of Wimbush and a combination of Mitzlaff and Wimbush, for the reasons recited above with respect to claims 1 and 13.

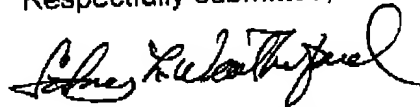
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CONCLUSION

In view of the foregoing remarks, the Applicants believe all of the claims currently pending in the Application to be in a condition for allowance. The Applicant, therefore, respectfully requests that the Examiner withdraw all rejections and issue a Notice of Allowance for Claims 1-9, 11-15 and 17.

The Applicants request a telephonic interview if the Examiner has any questions or requires any additional information that would further or expedite the prosecution of the Application.

Respectfully submitted,



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